

IN THE CLAIMS

1. (currently amended) A free weight assistance and training device comprising:

a base;

a generally upright weight support structure mounted on and extending upwards from and over said base;

a free weight support bar;

a computer-controlled weight tensioning device mounted on said base generally adjacent said upright weight support structure;

at least two cables movably mounted on said upright weight support structure and extending between and connecting said free weight support bar and said computer-controlled weight tensioning device;

said computer-controlled weight tensioning device, said at least two cables and said free weight support bar operatively cooperating such that tensioning force applied by said computer-controlled weight tensioning device via said at least two cables to said free weight support bar controllably decreases the amount of downwards force exerted by said free weight support bar due to the weight of said free weight support bar and weights thereon whereby a user of said free weight assistance and training device may receive assistance during lifting of said free weight support bar via said computer-controlled weight tensioning device; and:

a bar position detector device including two interconnected elements, a cable angle detection device and a bar position detection light curtain, each connected in information transmission

1 connection with said computer-controlled weight tensioning mechanism, said cable angle
2 detection device and said bar position detection light curtain cooperating to determine the
3 position of said free weight support bar during a lift, said cable angle detection device
4 mounted on said generally upright weight support structure generally adjacent each of said
5 cables to detect the angles at which said cables depend from said generally upright weight
6 support structure, said cable angle being computed in combination with the length of said
7 cables to track the location of the free weight support bar thereby permitting the user of said
8 free weight assistance and training device to maintain a better lift track during the lift thus
9 reducing the chance of injury from improper lifting.

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11 2. (original) The free weight assistance and training device of claim 1 wherein said
12 base comprises at least two base feet having leveling pads mounted on the undersides thereof.

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14 3. (original) The free weight assistance and training device of claim 1 wherein said
15 generally upright weight support structure comprises at least one main weight support post mounted
16 on and extending upwards from said base, and at least one weight support beam mounted atop each
17 of said at least one main weight support posts and extending forwardly therefrom.

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19 4. (original) The free weight assistance and training device of claim 1 wherein said
20 free weight support bar further comprises a handle grip sensing device mounted on said free weight
21 support bar and in information transmission connection with said computer-controlled weight
22 tensioning device, said handle grip sensing device operative to ensure that said free weight support
23 bar is being gripped by a user of said free weight assistance and training device, and upon detecting
24 release of said free weight support bar by a user, vertical movement of said free weight support bar
25 is restricted via said computer-controlled weight tensioning device until said free weight support bar
26 is again gripped by a user.

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28 5. (original) The free weight assistance and training device of claim 4 wherein said

1 handle grip sensing device on said free weight support bar further comprises a pair of light-sensitive
2 sensing units mounted on said free weight support bar, one adjacent each of a left and right weight
3 stop and each facing inwards towards the center of free weight support bar, a pair of reflective disks
4 movably mounted on said free weight support bar generally adjacent the center thereof, said
5 reflective disks adapted for movement towards or away from said light-sensitive sensing units, each
6 of said light-sensitive sensing units operative to send infrared beams of light outwards therefrom
7 extending generally parallel with said free weight support bar towards said pair of reflective disks,
8 the infrared beams being reflected back to said light-sensitive sensing units thereby signifying that
9 non-use of said free weight assistance and training device, and alternatively, upon use of said free
10 weight assistance and training device and placement of a user's hands on said free weight support
11 bar, the infrared beams are interrupted, said light-sensitive sensing units signaling said computer-
12 controlled weight tensioning device to confirm use and permitting movement of said free weight
13 support bar.

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15 6. (original) The free weight assistance and training device of claim 1 wherein said
16 computer-controlled weight tensioning device further comprises a computer-based control
17 mechanism at least including a hard drive, motherboard with processor, memory, and software
18 programmed to perform specified computing operations.

19
20 7. (original) The free weight assistance and training device of claim 1 wherein said
21 computer-controlled weight tensioning device comprises at least two cable reels mounted on
22 rotatably mounted reel shafts operative to permit said at least two cable reels to rotate to extend or
23 retract said cables which are wound thereon, the cable reel surface of each of said at least two cable
24 reels being threaded to generally ensure accurate take-up of said cables such that each rotation of said
25 at least two cable reels takes up a generally identical length of said cable.

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27 8. (original) The free weight assistance and training device of claim 7 further
28 comprising at least two drive motors each having a drive shaft, each drive shaft of said at least two

1 drive motors operatively connected to one of said at least two cable reels for rotation thereof in
2 response to rotation of said drive shafts, said computer-controlled weight tensioning device further
3 including at least two clutches each interposed between one of said drive shafts and one of said at
4 least two cable reels such that said at least two clutches alternatively engage and disengage said drive
5 shafts with said at least two cable reels for winding and unwinding said cables on said at least two
6 cable reels.

7
8 9. (original) The free weight assistance and training device of claim 8 further
9 comprising at least two sensor units each mounted generally adjacent one of said at least two reel
10 shafts, said at least two sensor units operative to detect the rotational speed, direction and amount
11 of rotation of each of said at least two reel shafts, said at least two sensor units in information
12 transmission connection with said computer-controlled weight tensioning device for transfer of said
13 rotational speed, direction and amount of rotation information thereto.

14
15 10. (original) The free weight assistance and training device of claim 9 wherein said
16 at least two sensor units each comprise a rotatable optical disk each connected to one of said at least
17 two reel shafts, said optical disks each including alternating light and dark radial sections, said at
18 least two sensor units further including sensor devices operative to count the number and speed of
19 the rotations of said optical disks via said alternating light and dark radial sections and forward that
20 information to said computer-controlled weight tensioning device whereby the speed, direction and
21 number of rotations of each of said at least two reel shafts is processable by said computer-controlled
22 weight tensioning device.

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24 11. (original) The free weight assistance and training device of claim 10 further
25 comprising a lift motor operative to engage said at least two reel shafts via said clutches such that
26 said lift motor rotates said at least two reel shafts and said at least two cable reels to wind said at
27 least two cables to alternatively raise and lower said free weight support bar by overpowering said
28 drive motors.

1 12. (original) The free weight assistance and training device of claim 11 further
2 comprising at least two reel brakes operatively associated with said at least two reel shafts to
3 alternatively permit and prevent rotation of said at least two reel shafts to wind and unwind said at
4 least two cables.

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6 13. (original) The free weight assistance and training device of claim 1 further
7 comprising a balance pad positioned generally below said free weight support bar on a floor surface
8 and connected in information transmission connection with said computer-controlled weight
9 tensioning mechanism, said balance pad operative to track the weight distribution of a user of said
10 free weight assistance and training device during the lifting of said free weight support bar for
11 increasing efficiency of the lift.

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13 14. (canceled).

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15 15. (currently amended) The free weight assistance and training device of claim 1 ~~claim~~
16 ~~14~~ wherein said bar position detection light curtain is mounted on said generally upright weight
17 support structure generally adjacent an upper section thereof and extending generally horizontally,
18 said bar position detection light curtain operative to project a light curtain generally vertically
19 downwards to a receiver bar mounted adjacent said base, said bar position detection light curtain
20 further operative to detect interruption of said light curtain and transmit the horizontal location of
21 the interruption to said computer-controlled weight tensioning mechanism such that as said free
22 weight support bar is moved through said bar position detection light curtain, the horizontal
23 interruptions of the light curtain are recorded and the computer-controlled weight tensioning
24 mechanism can calculate and graph the horizontal path of said free weight support bar during a lift.

1 16. (currently amended) A free weight assistance and training device comprising:
2
3 a base;
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5 a generally upright weight support structure mounted on and extending upwards from and over said
6 base;
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8 a free weight support bar;
9
10 a computer-controlled weight tensioning device mounted on said base generally adjacent said
11 upright weight support structure;
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13 at least two cables movably mounted on said upright weight support structure and extending between
14 and connecting said free weight support bar and said computer-controlled weight tensioning
15 device;
16
17 rotatably mounted reel means operatively connected to said computer-controlled weight tensioning
18 device for winding said at least two cables thereon to extend and retract said at least two
19 cables;
20
21 drive means operatively connection with said reel means for rotation thereof;
22
23 at least one sensor unit operatively connected to said computer-controlled weight tensioning device
24 and said reel means operative to detect rotation of said reel means and signal said computer-
25 controlled weight tensioning device regarding speed and direction of rotation of said reel
26 means;
27
28 said at least one sensor unit comprising a rotatable optical disk including alternating light and dark

1 radial sections, said at least one sensor unit further including a sensor device operative to
2 count the number and speed of the rotations of said optical disk via said alternating light and
3 dark radial sections and forward that information to said computer-controlled weight
4 tensioning device whereby the speed, direction and number of rotations of said reel means
5 is processable by said computer-controlled weight tensioning device;
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7 said computer-controlled weight tensioning device, said at least two cables, said reel means, said at
8 least one sensor unit ~~sensor means~~ and said free weight support bar operatively cooperating
9 such that upon detection of stoppage of rotation of said reel means by said sensor means prior
10 to completion of a lift, tensioning force is applicable by said computer-controlled weight
11 tensioning device via said at least two cables to said free weight support bar to controllably
12 decrease the amount of downwards force exerted by said free weight support bar due to the
13 weight of said free weight support bar and weights thereon whereby a user of said free weight
14 assistance and training device may receive assistance during lifting of said free weight
15 support bar prior to completion of a lift via said computer-controlled weight tensioning
16 device.
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1 17. (currently amended) A free weight assistance and training device comprising:
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3 a base;
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5 a generally upright weight support structure mounted on and extending upwards from and over said
6 base;
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8 a free weight support bar;
9
10 a weight tensioning device mounted on said base generally adjacent said upright weight support
11 structure;
12
13 a computer-based control device operatively connected to said weight tensioning device, said
14 computer-based control device including software programming operative to control
15 engagement and disengagement of said weight tensioning device in response to selected
16 movement of said free weight support bar;
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18 at least two cables movably mounted on said upright weight support structure and extending between
19 and connecting said free weight support bar and said weight tensioning device;
20
21 rotatably mounted reel means operatively connected to said weight tensioning device for winding
22 said at least two cables thereon to extend and retract said at least two cables;
23
24 drive means operatively connection with said reel means for rotation thereof;
25
26 at least one sensor unit operatively connected to said weight tensioning device, said computer-based
27 control device and said reel means, said at least one sensor unit operative to detect rotation
28 of said reel means and signal said computer-based control device regarding speed and

1 direction of rotation of said reel means;

2
3 said at least one sensor unit comprising a rotatable optical disk including alternating light and dark
4 radial sections, said at least one sensor unit further including a sensor device operative to
5 count the number and speed of the rotations of said optical disk via said alternating light and
6 dark radial sections and forward that information to said computer-controlled weight
7 tensioning device whereby the speed, direction and number of rotations of said reel means
8 is processable by said computer-controlled weight tensioning device;

9
10 said computer-based control device, said weight tensioning device, said at least two cables, said reel
11 means, said at least one sensor unit ~~sensor means~~ and said free weight support bar operatively
12 cooperating such that upon detection of stoppage of rotation of said reel means by said sensor
13 means prior to completion of a lift, said computer-based control device commands said
14 weight tensioning device to apply tensioning force to said free weight support bar via
15 engagement of said drive means to apply rotational force to said reel means thus tensioning
16 said at least two cables connected to said free weight support bar to controllably decrease the
17 amount of downwards force exerted by said free weight support bar due to the weight of said
18 free weight support bar and weights thereon whereby a user of said free weight assistance
19 and training device may receive assistance during lifting of said free weight support bar prior
20 to completion of a lift.